

DISCUSSION OF THE CLAIMS

Claims 1-3, 7-8 and 10-11 are pending in the present application. Claims 4-6, 9 and 12-13 are canceled claims. Independent Claims 1 and 11 are amended to recite features of previously presented Claims 12 and/or 13 and further for matters of form.

No new matter is added.

REMARKS/ARGUMENTS

Independent Claims 1, 7 and 11 are amended herein to include features from previously presented Claims 12 and/or 13. Applicants submit that entry and consideration of the amended claims and the remarks presented below is appropriate for the reason that the subject matter now argued was present the previously presented claims 12 and 13. The subject matter of Claims 12 and 13 was brought to the Office's attention on page 9 of Applicants' December 4, 2009 Amendment. Thus, irrespective of the finality of the present Office Action, Applicants submit that entry of the amended claims and reconsideration is appropriate.

Each of Claims 1, 7 and 11 recite a step of selectively oxidizing a silicon film to form an oxide film "so as not to form the oxide film on an exposed surface" of a film formed mainly of tungsten (see Claim 1); "so as not to form the oxide film on an exposed surface of the film mainly formed of the tungsten" (Claim 7) and "so as not to oxidize [a] high melting point metallic member" (see Claim 11).

The Office cites to Segawa (U.S. 2001/0020707) in support of the assertion that the presently claimed invention is obvious. The Office cites, in particular, to paragraphs [0061] and [0062] as evidence that Segawa discloses a process in which a substrate containing a first layer made of silicon and a second layer made of a metal is subjected to treatment with an oxygen-containing gas. This disclosure, however, is different from the requirement of the present claims that the gas consist of hydrogen, oxygen and argon. This point is important because the oxidation gas of Segawa also oxidizes a corresponding metal-based film. See for example the following disclosure in paragraph [0062]:

Due to O₂ plasma used during the ashing, exposed side faces of the gate electrodes 3 are oxidized, forming plasma oxide films 5. In this oxidation, thick oxide films are formed on the side faces of the bottom gate electrodes 3a made of polysilicon having a large oxidation rate. The side faces of the top gate electrodes 3c made of W are slightly oxidized, but the side

faces of the barrier metal films 3b made of WN are hardly oxidized.

The Segawa process is necessarily excluded from the process of present Claims 1, 7 and 11. The presently claimed process excludes oxidation of a W-based layer. There is therefore no overlap between the process of Segawa and the processes recited in the present claims.

Irrespective of the mutual exclusivity between the presently claimed invention and the process described in Segawa, the Office relies on Verhaverbeke (U.S. 7,159,599) as further evidence of obviousness, in particular as a basis for asserting that it would be obvious to use a gas consisting of argon, hydrogen and oxygen in the Segawa process. The Office improperly cites to disparate disclosure in the Verhaverbeke patent as support that one of skill in the art would use a gas mixture containing hydrogen, argon and oxygen to carry out the ashing/oxidation of Segawa.

First the Office cites to column 28, lines 30-31 where Verhaverbeke describes an “oxidation process” but does not disclose any particular gas composition. The Office further cites to column 39, lines 43-55 as evidence that certain hydrogen/oxygen ratios falling within the hydrogen/oxygen ratio of the present claims would be obvious. However, the hydrogen/oxygen ratios described at column 39 in Verhaverbeke relate to processes in which steam is present or is used as an oxidant (see for example column 39, lines 58-61).

Applicants draw the Office’s attention to a research report that was submitted in U.S. Application No. 11/036,128. A copy of the research report and a certified English translation thereof are submitted herewith. The research report serves to show that a process gas which consists of argon, oxygen and hydrogen and which is employed at a hydrogen/oxygen flow rate ratio of 2-4 cannot form the steam specie described in column 39 of Verhaverbeke. In particular, Figures 3 and 4 of the research report show that the occurrence of the species H_2O^+ is substantially absent at flow rate ratios recited in the present claims. Figures 3 and 4

describe results obtained with an oxygen gas flow rate of 5 sccm. The hydrogen gas flow rate must be set at a level of at least 10 sccm in order to meet the lower threshold of flow rate ratio recited in the present claims (i.e., H_2 gas flow rate/ O_2 gas flow rate = 2). It is evident that those of skill in the art would not choose the flow rate ratio recited in the present claims as a condition of the Segawa process in view of the Verhaverbeke disclosure because doing so would not form the steam specie that is an aspect of the Verhaverbeke process gas.

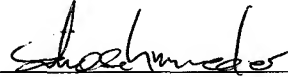
In any case, the steam-based process of Verhaverbeke does not include argon gas. The Office cites to column 43 of Verhaverbeke as evidence that it would be obvious to include argon in the process gas of Segawa. However, the disclosure at column 43 of Verhaverbeke describes an annealing step, not an oxidation step. At best those of skill in the art would derive a suggestion to use argon for annealing but not for oxidizing. The Office's reliance on Verhaverbeke in combination with Segawa is thus further not supportable.

Applicants submit that it is not necessary for the Office to rely on the research report as an evidentiary basis for determining patentability in the present application. The research report is provided for information only and in view of the fact that the research report is of record in one of Applicants' co-pending applications.

For the reasons discussed above, Applicants submit that withdrawal of the rejections is appropriate. Applicants respectfully request withdrawal of the rejections and the allowance of all now-pending claims.

Respectfully submitted,

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